

CLAIMS

- 1 A mirror with no copper layer which comprises:
a glass substrate;
palladium provided at a surface of the glass substrate;
a silver coating layer on said surface of the glass substrate; and
5 an exposed paint layer overlaying the silver coating layer, this paint layer
being an epoxy paint layer;
the mirror having at least one of the following properties:
(a) a scratch resistance determined by the Clemen test showing scratches of
less than 10 μm when applying a weight of 1500 g;
10 (b) a hardness determined by the Persoz pendulum of at least 250 s;
(c) a commercially acceptable resistance to at least one glue selected from
the group consisting of an oxime, an alcoxy, a MS polymer and a rubber
glue.
- 2 A mirror with no copper layer which comprises:
15 a glass substrate;
at least one material selected from the group consisting of bismuth,
chromium, gold, indium, nickel, platinum, rhodium, ruthenium, titanium,
vanadium and zinc provided at a surface of the glass substrate;
a silver coating layer on said surface of the substrate; and
20 an exposed paint layer overlaying the silver coating layer, this paint layer
being an epoxy paint layer;
the mirror having at least one of the following properties:
(a) a scratch resistance determined by the Clemen test showing scratches of
less than 10 μm when applying a weight of 1500 g;
25 (b) a hardness determined by the Persoz pendulum of at least 250 s;
(c) a commercially acceptable resistance to at least one glue selected from

the group consisting of an oxime, an alcoxy, a MS polymer and a rubber glue.

- 3 A mirror which comprises:
a glass substrate;
- 5 a silver coating layer on a surface of the glass substrate; and
an exposed paint layer overlaying the silver coating layer, this paint layer
being an epoxy paint layer;
the mirror having at least one of the following properties:
(a) a scratch resistance determined by the Clemen test showing scratches of
10 less than 10 μm when applying a weight of 1500 g;
(b) a hardness determined by the Persoz pendulum of at least 250 s;
(c) a commercially acceptable resistance to at least one glue selected from
the group consisting of an oxime, an alcoxy, a MS polymer and a rubber
glue.
- 15 4 The mirror according to claim 3, in which at least one material selected from
the group consisting of bismuth, chromium, gold, indium, nickel, palladium,
platinum, rhodium, ruthenium, titanium, vanadium and zinc is provided at
the surface of the glass substrate which is coated with the silver coating layer.
- 5 5 The mirror according to any preceding claim, in which the exposed epoxy
20 paint layer is the only layer of paint of the mirror.
- 6 The mirror according any preceding claim, wherein the mirror has at least
two of the following properties:
(a) a scratch resistance determined by the Clemen test showing scratches of
less than 10 μm when applying a weight of 1500 g;
25 (b) a hardness determined by the Persoz pendulum of at least 250 s;
(c) a commercially acceptable resistance to at least one glue selected from
the group consisting of an oxime, an alcoxy, a MS polymer and a rubber
glue.

- 7 The mirror according any preceding claim, wherein the mirror has all of the following properties:
- (a) a scratch resistance determined by the Clemen test showing scratches of less than 10 μm when applying a weight of 1500 g;
- 5 (b) a hardness determined by the Persoz pendulum of at least 250 s;
- (c) a commercially acceptable resistance to at least three glues selected from the group consisting of an oxime, an alcoxy, a MS polymer and a rubber glue.
- 8 The mirror according any preceding claim, wherein the mirror has commercially acceptable resistance to all the glues selected from the group consisting of an oxime, an alcoxy, a MS polymer and a rubber glue.
- 10 9 The mirror according to any preceding claim, wherein tin is present at the surface of the glass substrate adjacent to the silver layer.
- 10 The mirror according to any preceding claim, wherein the epoxy paint layer has a thickness in the range 25-55 μm .
- 15 11 The mirror according to claim 10, wherein the epoxy paint layer has a thickness in the range 35-40 μm .
- 12 The mirror according to any preceding claim, wherein at least one material selected from the group consisting of tin, chromium, vanadium, titanium, iron, indium, copper and aluminium is present at the surface of the silver coating layer which is adjacent to the paint layer overlaying the silver coating layer.
- 20 13 The mirror according to any preceding claim, wherein the silver coating layer has a thickness of 60 to 110 nm.
- 25 14 The mirror according to any preceding claim, wherein the epoxy paint layer is substantially lead-free.

- 15 15 The mirror according to any preceding claim, wherein traces of silane are present at the surface of the silver coating layer adjacent to the paint layer.
- 16 16 The mirror according to any preceding claim, wherein the mirror has an average edge corrosion of less than 200μ when subjected to a 120 hour CASS test.
- 5 17 The mirror according to any preceding claim, wherein the mirror has an average edge corrosion of less than 50μ when subjected to a 480 hour salt fog test.
- 18 18 A mirror with no copper layer which consists essentially of, in the order recited:
10 a substrate in the form of a flat, soda lime glass sheet having a surface, palladium and tin provided at said surface of the glass sheet, a silver coating layer on said surface of the glass sheet, tin present at the surface of the silver coating layer,
15 a single, exposed paint layer covering the silver coating layer, this paint layer being an epoxy paint layer;
the mirror having all of the following properties:
(a) a scratch resistance determined by the Clemens test showing scratches of less than 10μ when applying a weight of 1500 g;
20 (b) a hardness determined by the Persoz pendulum of at least 250 s;
(c) a commercially acceptable resistance to at least three glues selected from the group consisting of an oxime, an alkoxy, a MS polymer and a rubber glue;
(d) an average edge corrosion of less than 200μ when subjected to a 120
25 hour CASS test.
- 19 19 A process for manufacturing a mirror with no copper layer which comprises the following steps:
providing a glass substrate;
sensitising the glass substrate by contacting it with a solution comprising ions

of tin;

activating the glass substrate by contacting it with a solution comprising ions of at least one material selected from the group consisting of bismuth, chromium, gold, indium, nickel, palladium, platinum, rhodium, ruthenium, titanium, vanadium, tin and zinc;

contacting the glass substrate with a silvering solution so as to form a silver coating; and

applying at least one epoxy paint layer over the silvered substrate.

A process in accordance with claim 19, in which the epoxy paint layer is applied by curtain coating using a liquid epoxy paint having a solvent content in the range of 10% to 20% by weight.